

# Bears in Alberta and Sweden; what can we learn from each other?

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Grizzly bear = brown bear



# Goals SBBP

- Document the brown bear's basic ecological relationships
- Provide data and recommendations for managers of bear populations
- Answer management-oriented questions with solid basic research



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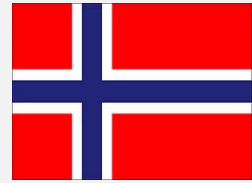
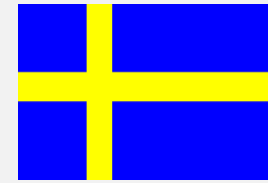
# Our main research topics

- Consequences of an increasing bear population for both humans and bears
- Management of an increasing bear population
- Ethical questions regarding research on bears
- Human medicine



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# Research collaborations



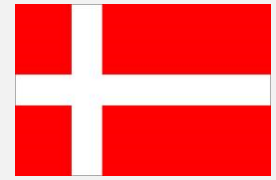
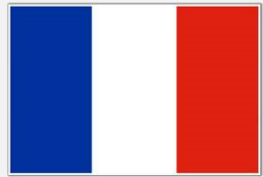
- Genetics:



- Life history:



- Human Medicine:



- Baiting:

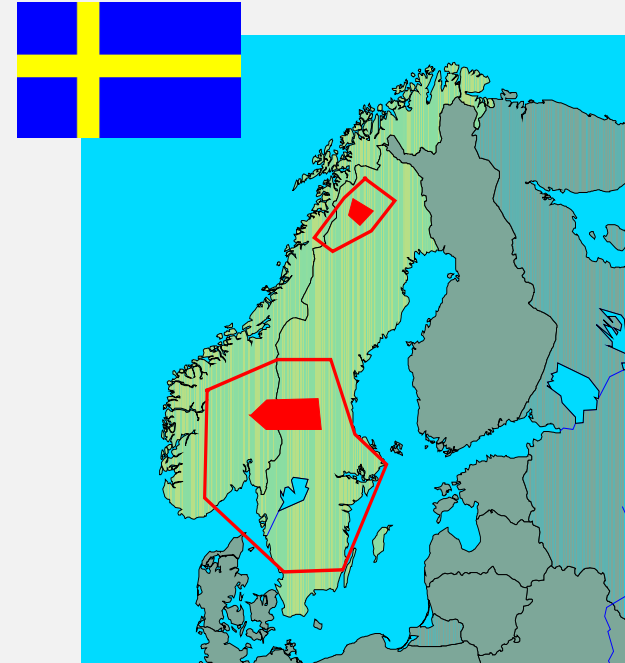


# Goals FRI GP

- To provide resource managers with the necessary knowledge and planning tools to ensure the long-term conservation of grizzly bears in Alberta

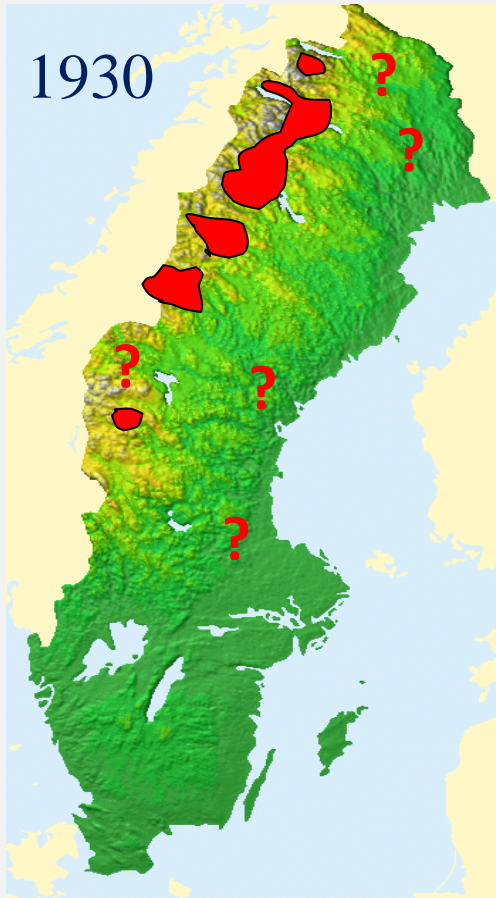


# Study areas



- Similar climate – continental
- Similar diet
- Resource extraction – forestry and mining
- Different population status and history:
  - Alberta: threatened
  - Sweden: increasing

# Growing population



1930: ~130

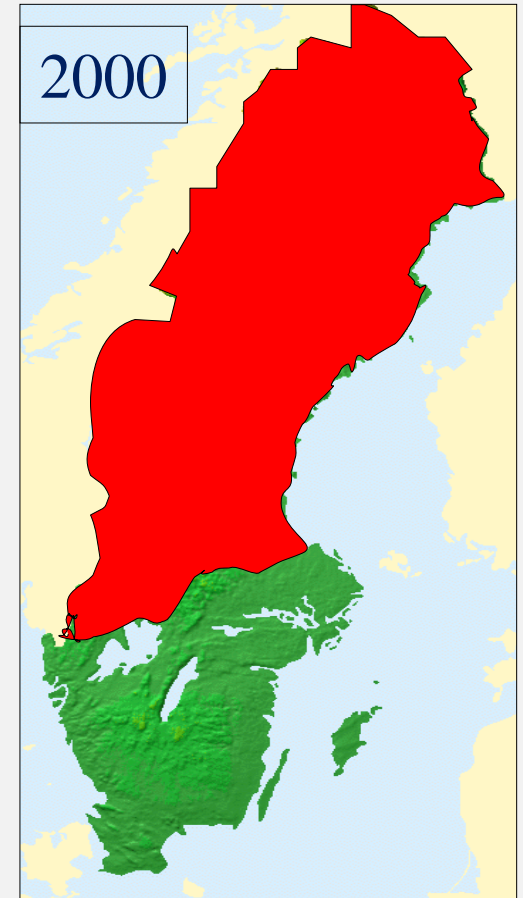
1942: ~300

1975: ~500

1996: ~1000

2004: ~2200

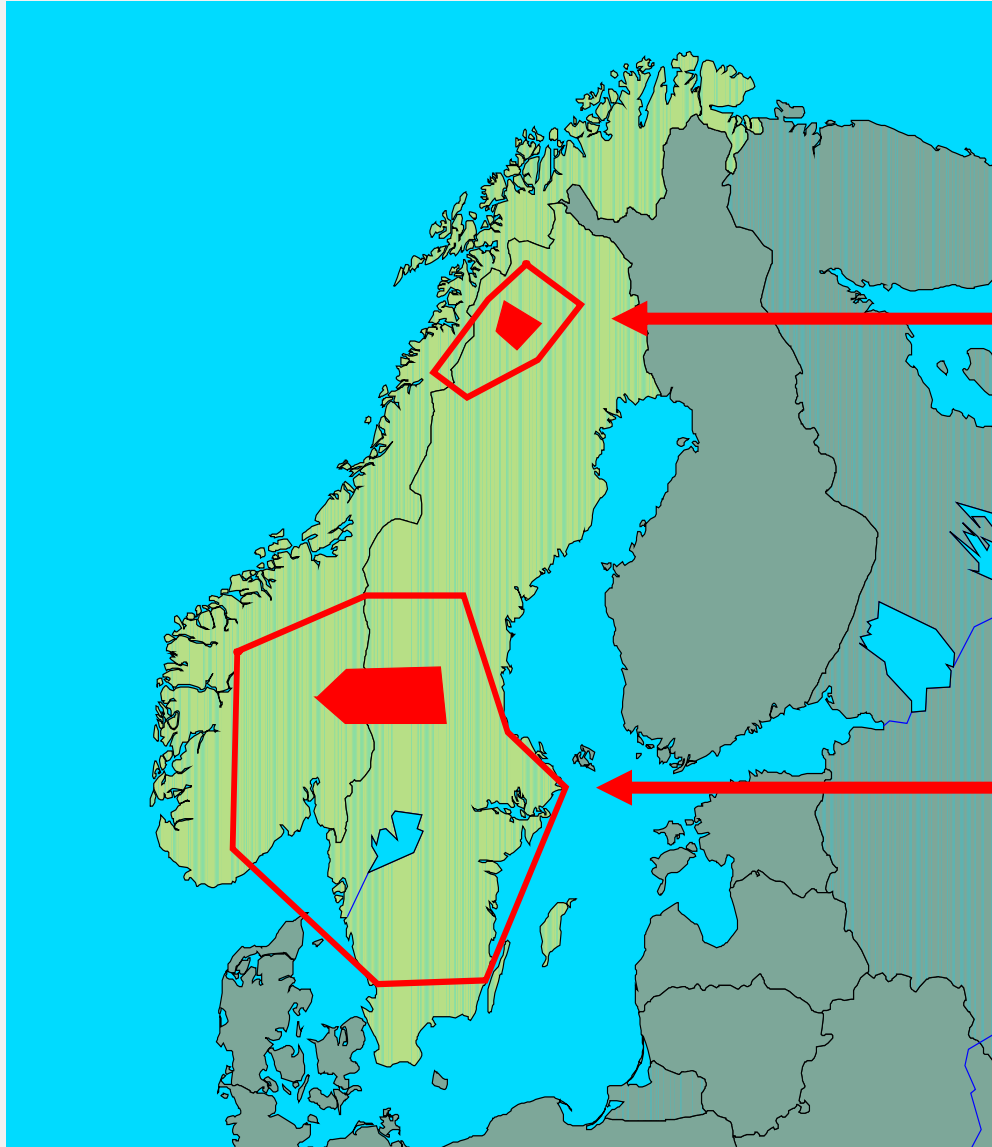
2010: ~3200



Annual growth rate of 16%, the fastest growing brown bear population in the world!



# Study areas



Since 1984

6,000 km<sup>2</sup>

100% marked

241 individuals

Since 1985

13,000 km<sup>2</sup>

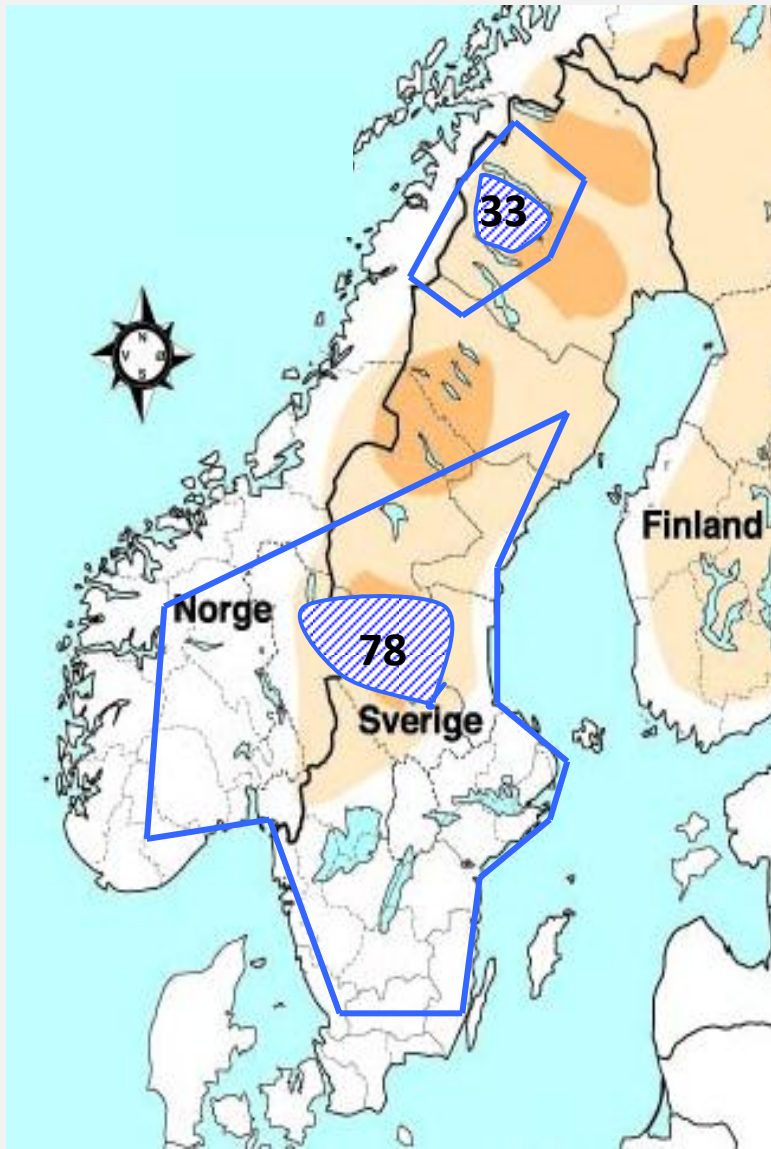
50-80% marked

421 individuals





# Collared bears 2010



	2010	Total
New bears	36	667
Collared		449
Max. collared	111	
Immobilized	112	1633
<b>2010:</b>	71 GPS	7000 positions/day

# Method SBBRP

GOAL: to follow an individual as long as possible,  
preferably life

- We capture bears from the helicopter
- Focus on mothers and their offspring
- Law: samples and measurements of all killed bears



# Example Mossihonan (W8811)

- Born 1978
- Captured 1988
- Radio-marked 13 years
- Captures 9
- Dead (shot) 2000  
(22 years)



# Mossi had 8 litters

- mother 22
- grandmother 62
- great-grandmother 63
- Great-great-grandmother 8

**Number descendents: 153**

**60 were/are radiocollared**



# The fate of these 153 bears

- Radiocollared 22
- Cubs of the year 7
- Unknown 30
- Dead 94
  - Abandoned 2
  - Died as cubs 44
  - Killed as yearlings by bears 7
  - >2 years, killed by bears 2
  - DOLP 3
  - Management 4
  - Hunting 30
  - Capture 2

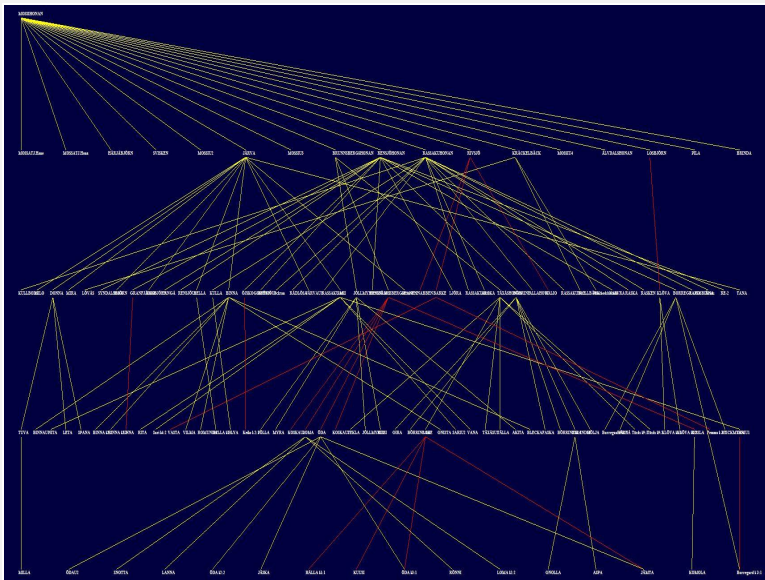






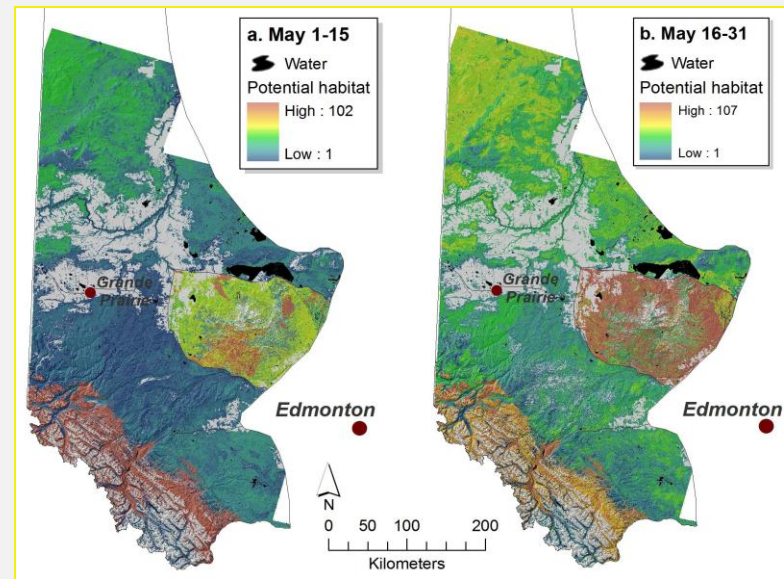
# Where we compliment each other...

- SBBP



Individual-based data


- FRI GP



Energetics in space and time



# Key collaboration questions

1. Habitat selection and utilization
  2. Response to forestry
  3. Comparison of chronic stress levels
  4. Understanding body size and its determinants
- 

# Reasons for the increase of bears in Sweden

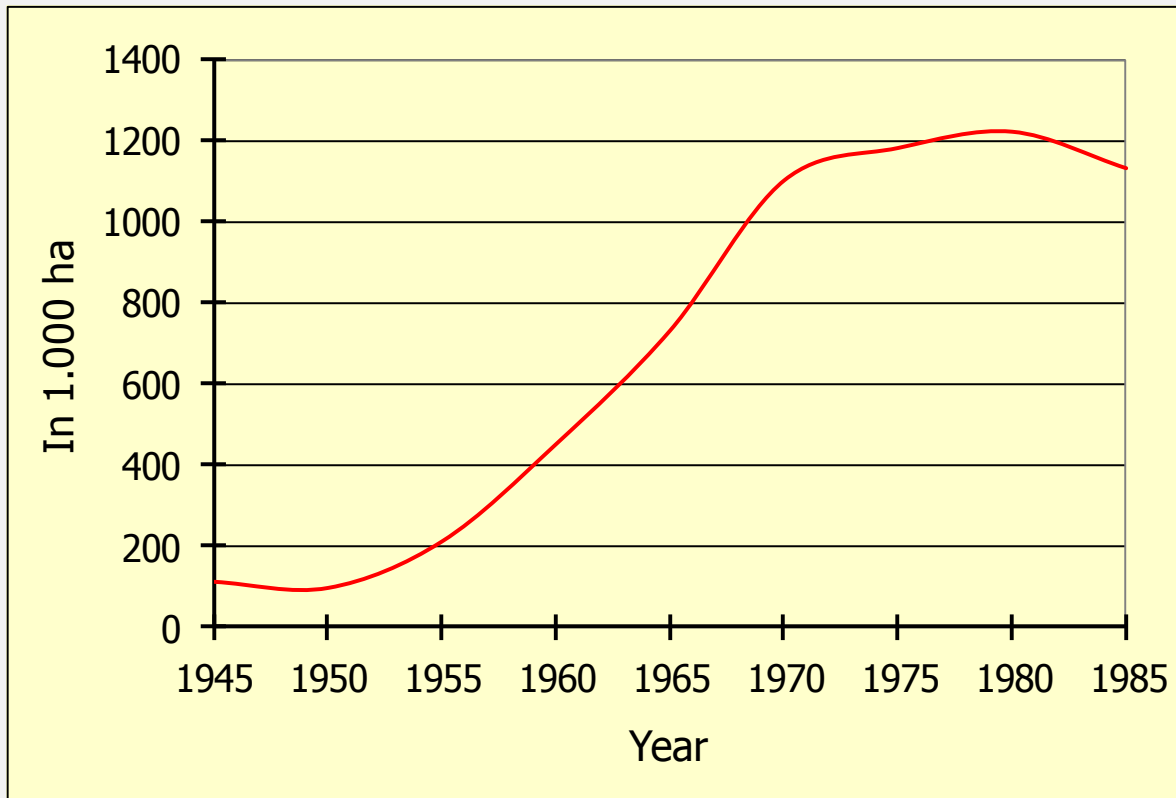
## Factors allowing increase

- Positive attitude
- Low levels of depredation
- Low human densities
- Conservative hunting quotas
- Some positive aspects of the industrial forest



# Forestry in Sweden = clearcuts

Sum 3-24 year old clearcuts



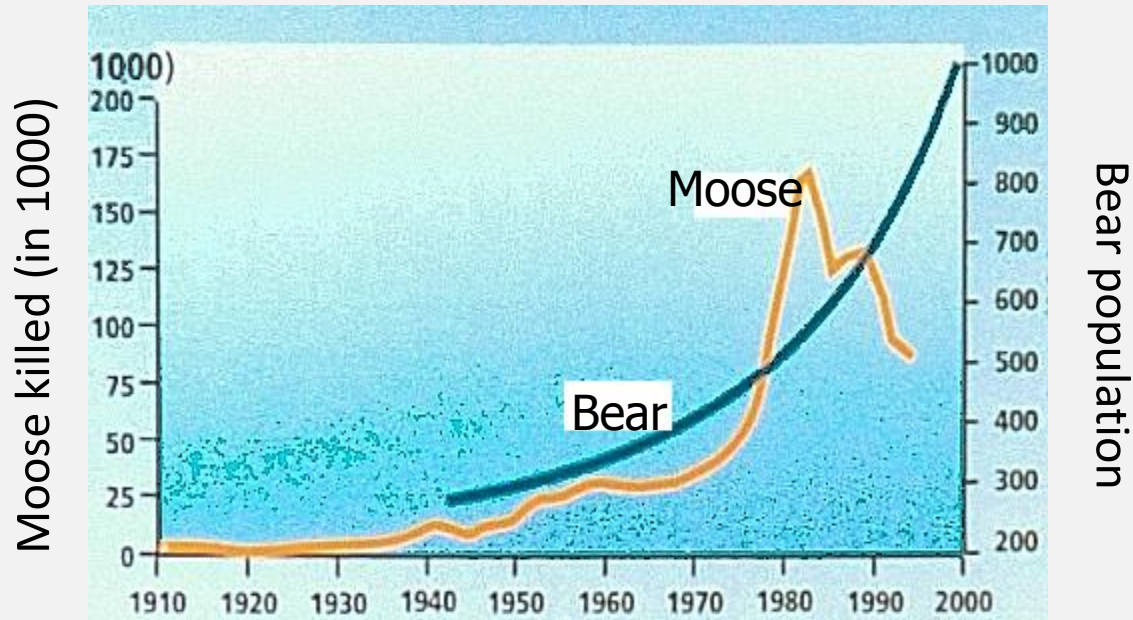
# Forestry

This type of forestry likely increased...

- ...ants
- ...berries
- ...moose



# Forestry – bear foods



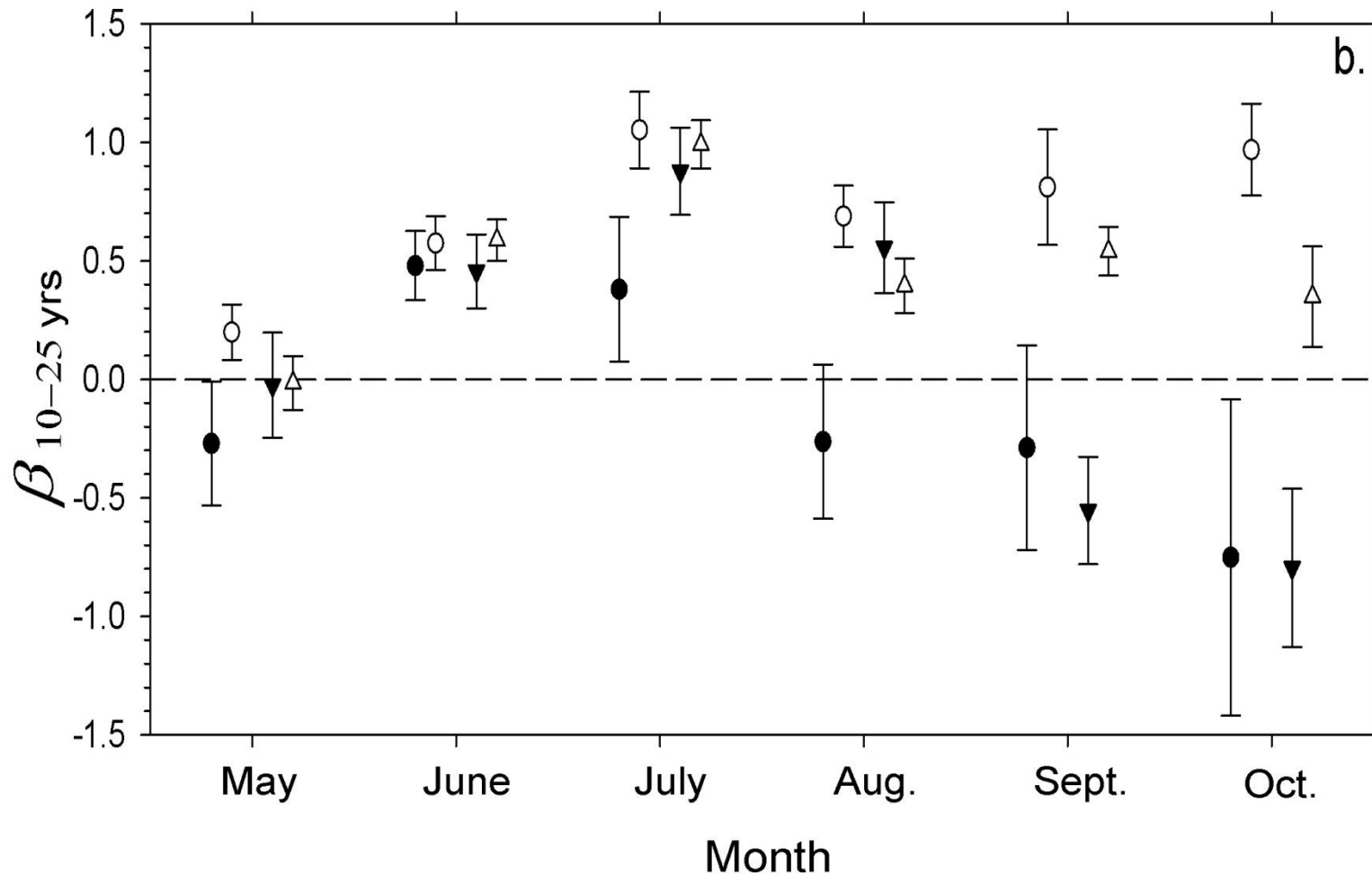
1% of adult moose

25% calves





# 1. Are clear-cut forests important habitats for brown bears in Alberta/Sweden?





© 2011 Google  
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53°42'50.41" N 117°36'35.19" W elev 1225 m

Eye alt 15.48 km

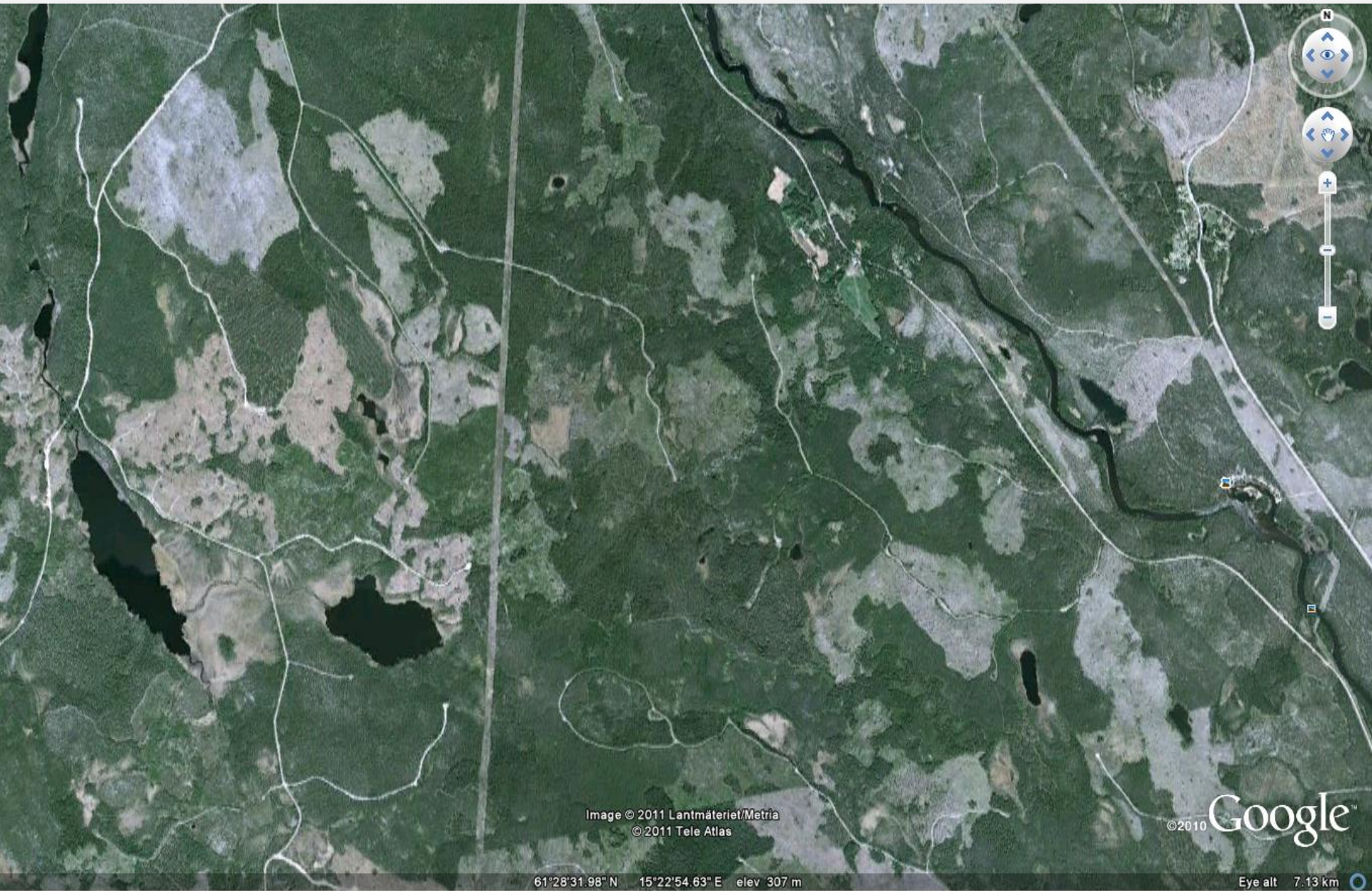


Image © 2011 Lantmäteriet/Metria  
© 2011 Tele Atlas

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61°28'31.98" N 15°22'54.63" E elev 307 m

Eye alt 7.13 km

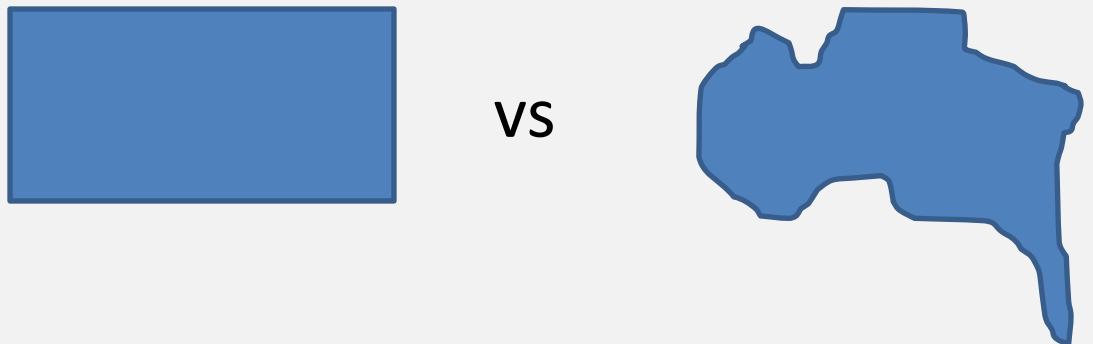


## 2. Do landscape metrics affect selection of clearcuts by bears?

- Does size matter?



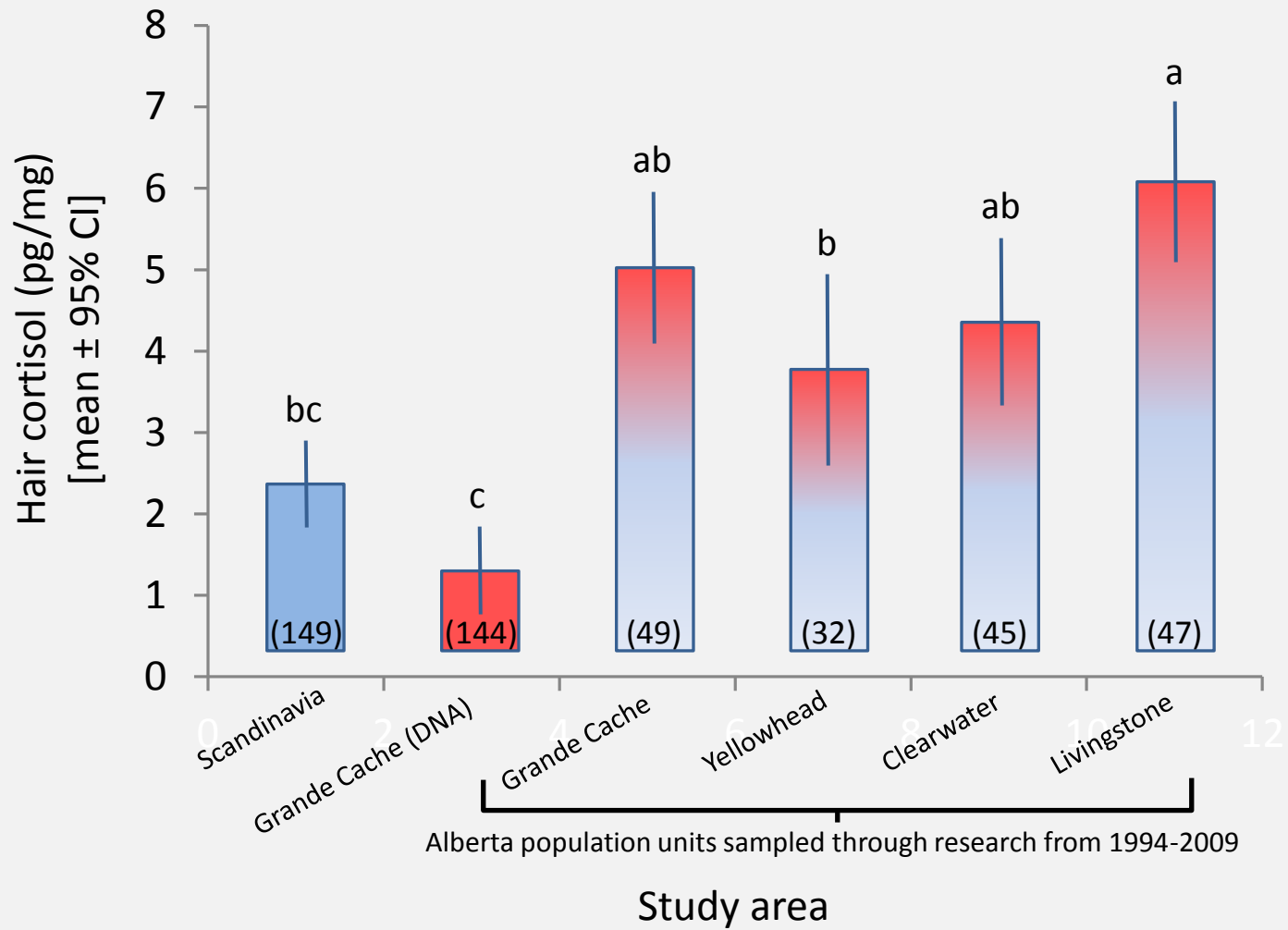
- Does shape matter?



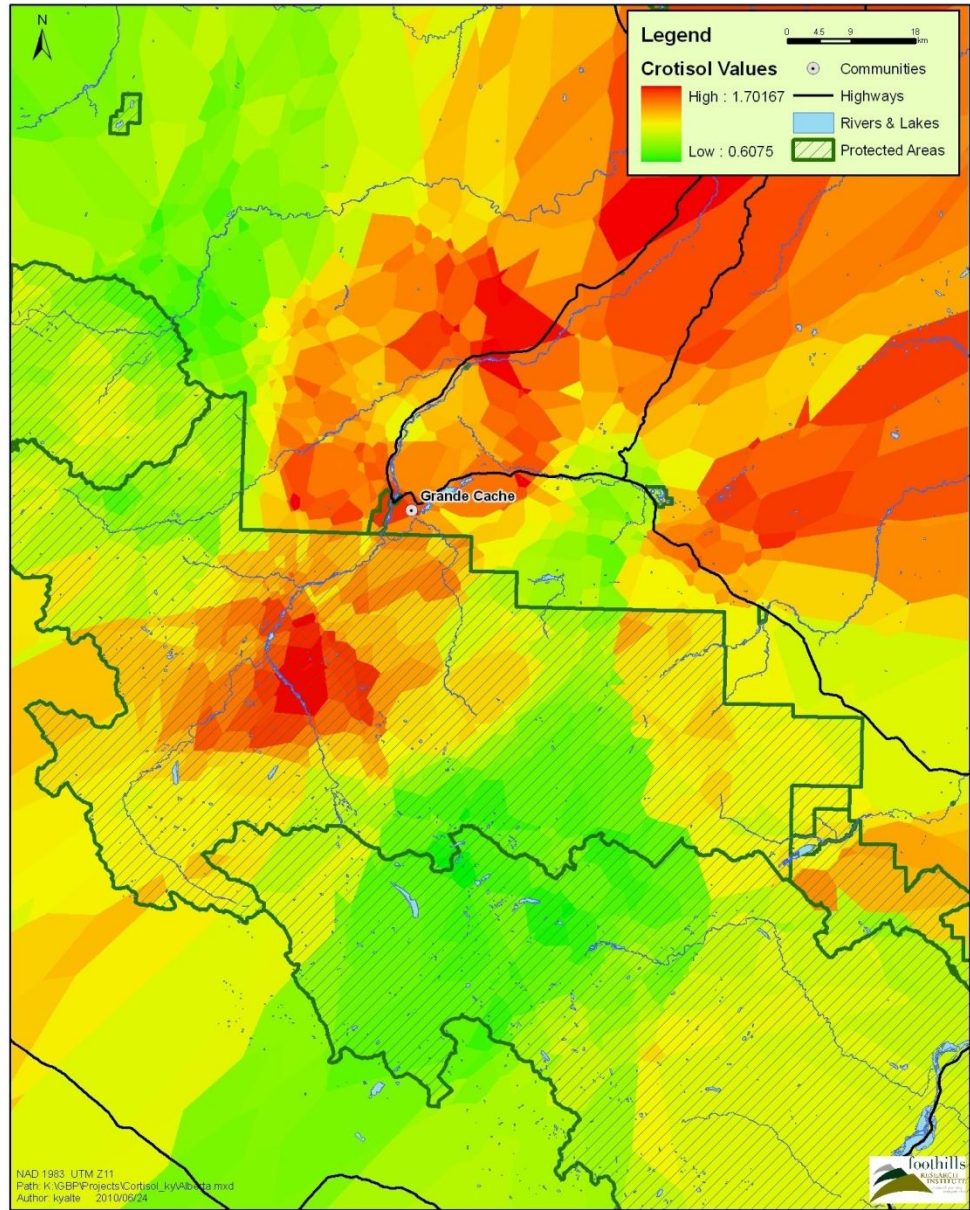
# Key collaboration questions

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2. Response to forestry
3. Comparison of chronic stress levels
4. Understanding body size and its determinants

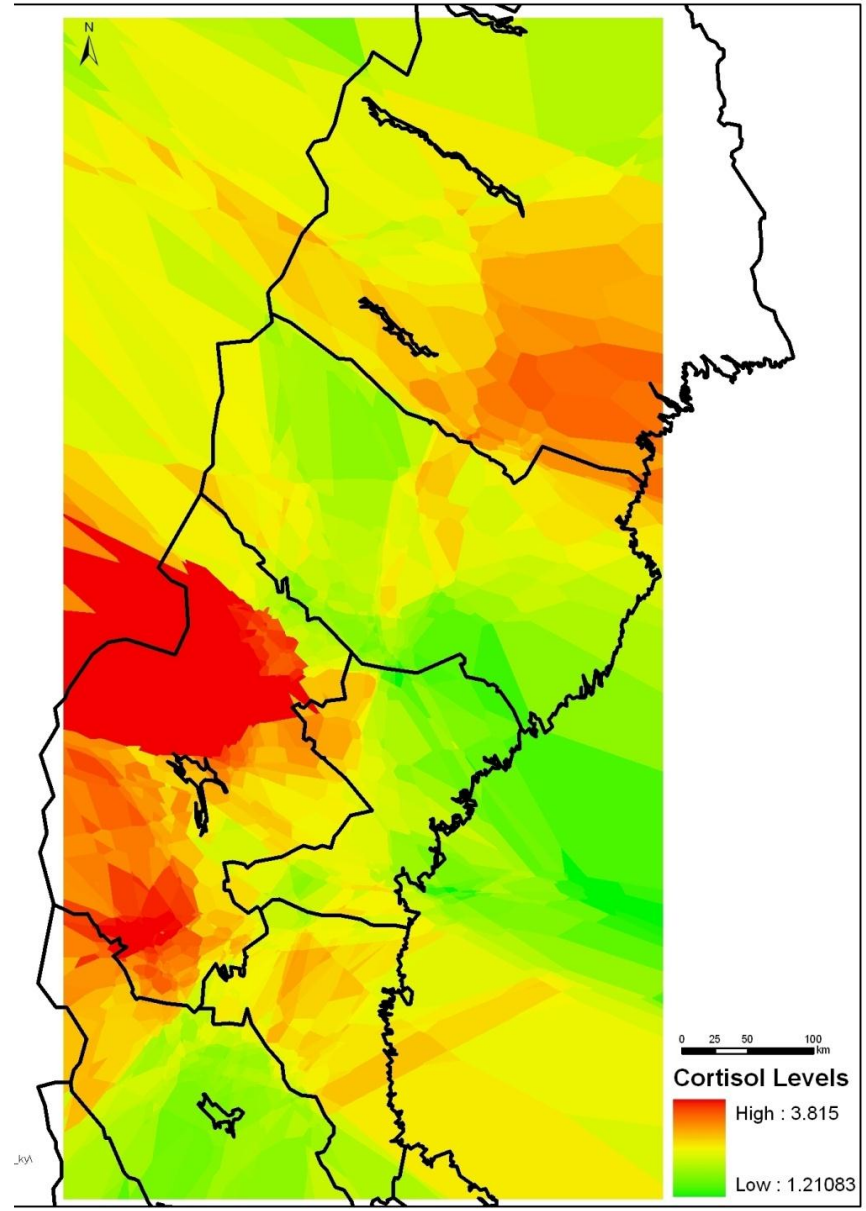




Preliminary Look at 2008 Grizzly Bear Hair Cortisol Levels in West Central Alberta



Preliminary Look at 2008 Grizzly Bear Hair Cortisol Levels in Scandinavia



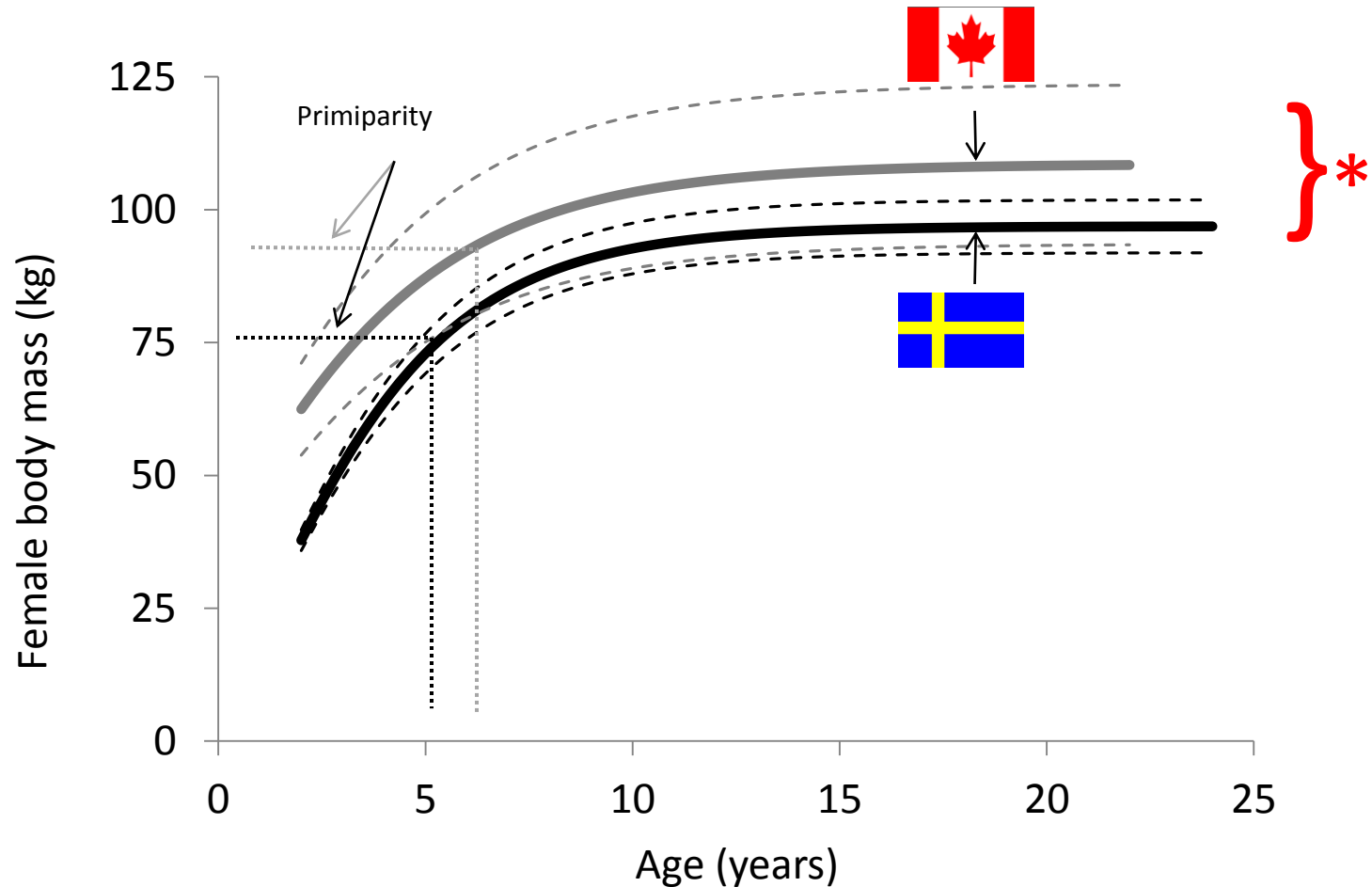


# Key collaboration questions

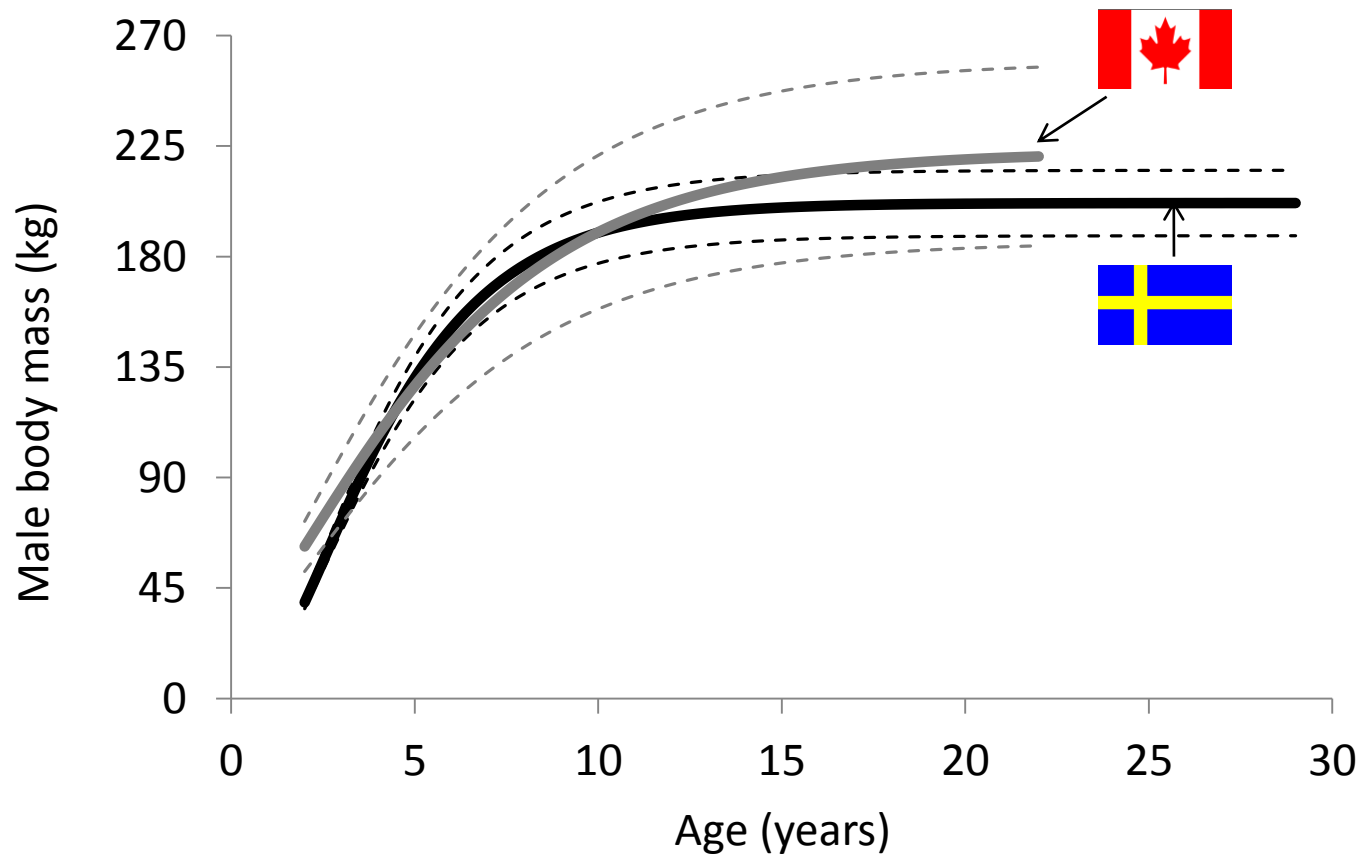
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# Female mass to age curve



# Male mass to age curve



# Determinants of size...

- Population density -> limited
- Positive effects of habitat (NDVI) -> strong
- Reproduction is costly for females
  
- Population status and population history may be important

# Size does matter!

## Life history theory:

- Body size -> major factor explaining survival and reproductive success

## Brown bears:

- Larger males produce more offspring  
(Zedrosser et al. 2007, J. Anim. Ecol.)
- Larger females have higher lifetime reproductive success  
(Zedrosser et al. Ecology)

# The population ecology of individuals (Łomnicki 1988)

In wildlife management most models assume homogeneous populations...

...but how true is that?

# Estimating individual contribution to population growth

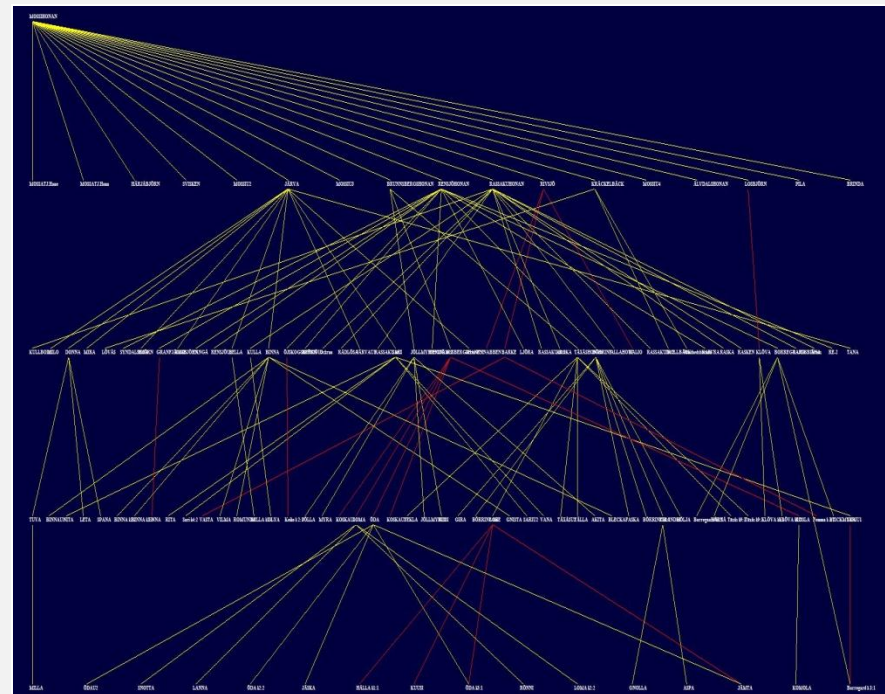
Coulson et al. (2006), Proc. Roy. Soc.

$$p_{t(i)} = \frac{S_{t(i)} - \bar{S}_t}{N_t - 1} + \frac{f_{t(i)} - \bar{f}_t}{N_t - 1}$$

Survival component

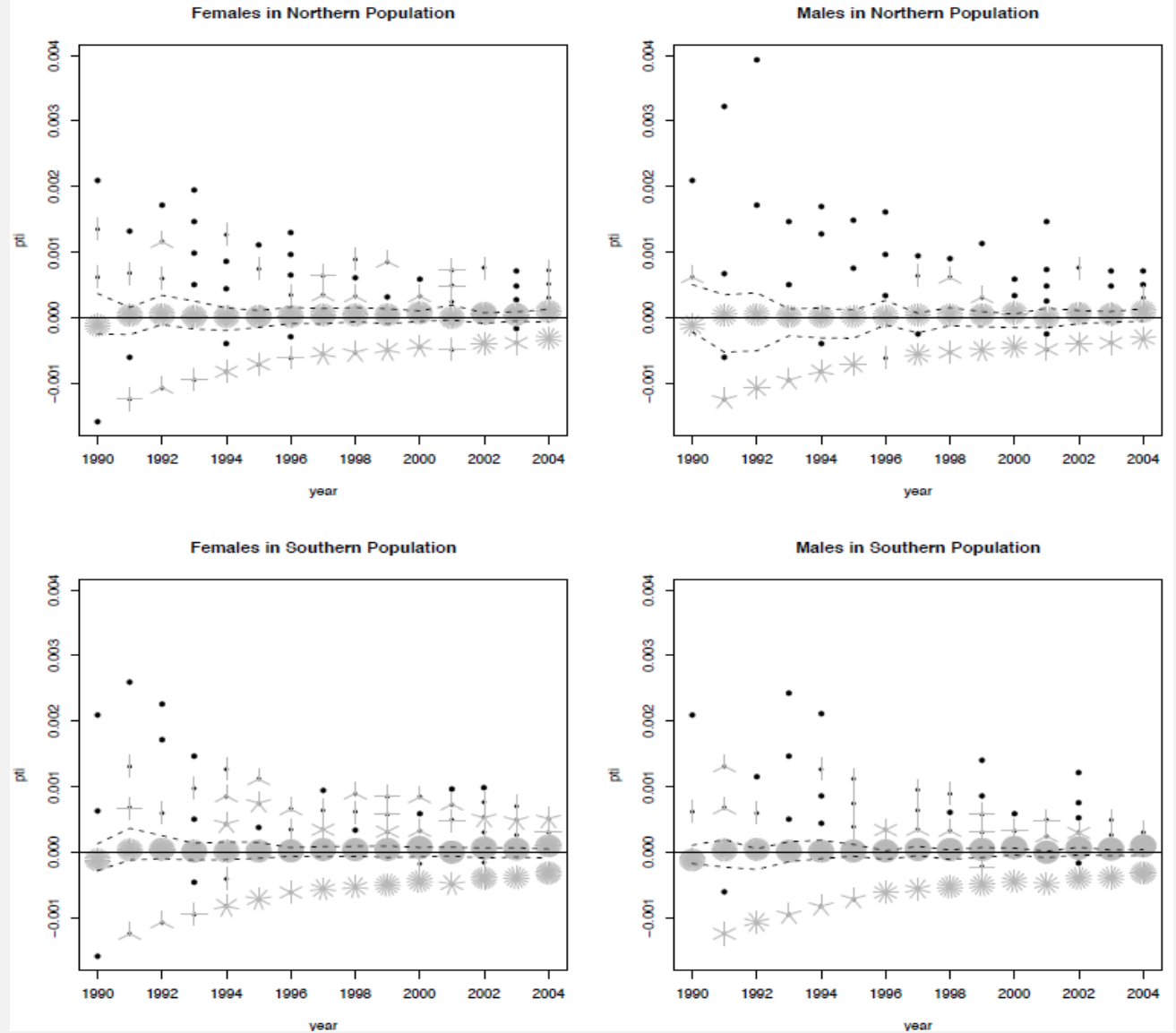


Fecundity component



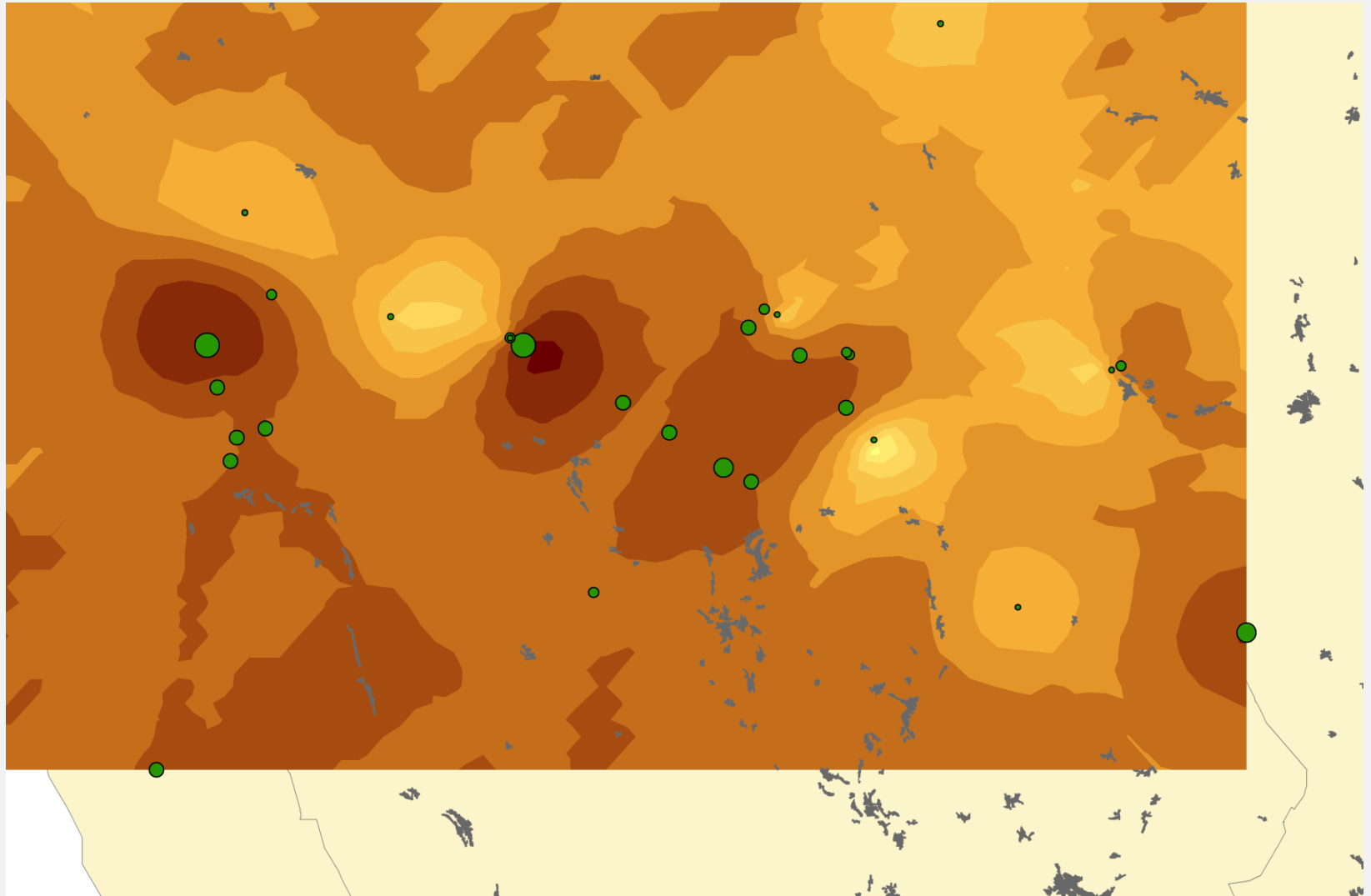
~~All animals are equal...~~ Orwell (1945), The animal farm.

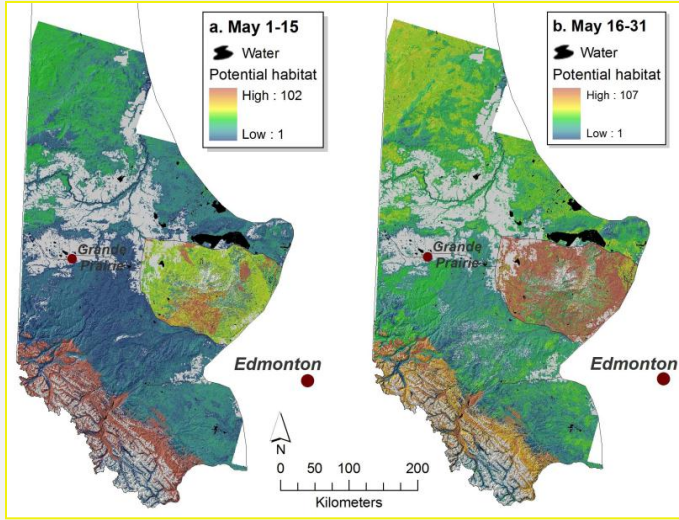
*Not all*



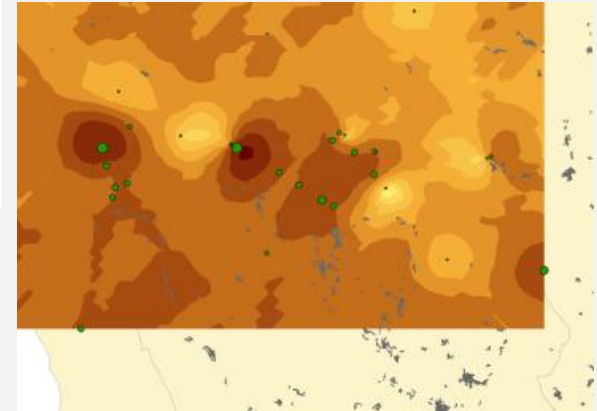
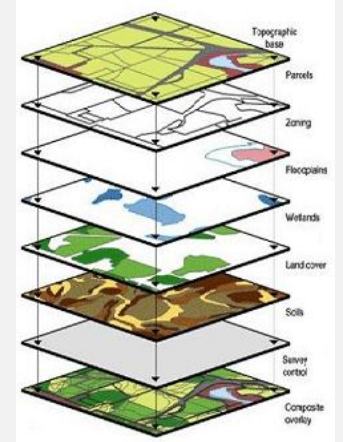
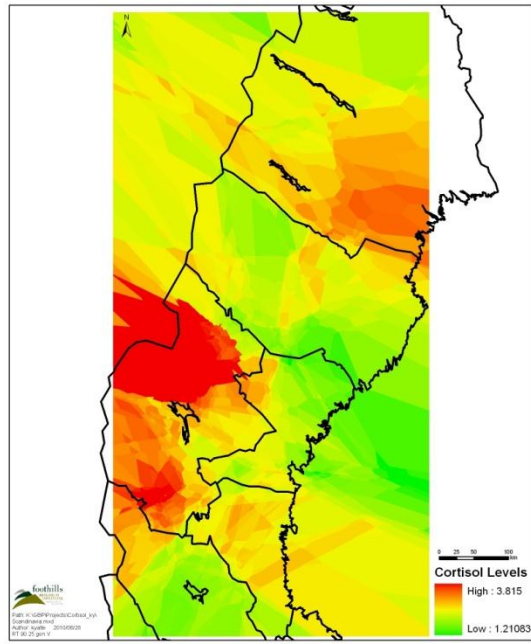


# Distribution of individual female contribution to population growth on the landscape





Preliminary Look at 2008 Grizzly Bear Hair Cortisol Levels in Scandinavia



Thank you for your attention!



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